Recycling Sludge to Produce Fertilizer

Camp S.D. Butler Finds an Innovative Way to Manage Its Solid Waste

Given limited space for solid waste disposal, Okinawa's Marine Corps Base (MCB) Camp S.D. Butler is now recycling its wastewater sludge on-island to minimize disposal costs and produce a low-cost fertilizer for local farmers.

Okinawa, a Japanese island in the west Pacific, has limited space for handling and disposal of solid waste. Most of Okinawa's solid waste management facilities are at or near capacity. So MCB Camp S.D. Butler on Okinawa, must be innovative about ensuring its solid waste is disposed of in the most efficient manner. MCB Camp S.D. Butler Facilities Engineer Division personnel were able to team with a local organic farmer to produce fertilizer that utilizes wastewater sludge from the base's facilities.

Okinawa is a small island that is part of Japan's chain of islands known as the Ryukyu Islands, extending from the southern tip of mainland Japan to north of Taiwan. Due to its location and size, it is difficult to recycle or dispose of materials on the island. And it is expensive to ship marketable recycling items to larger countries and there is limited space available at the island's landfills. Camp S.D. Butler is composed of eight major installations on Okinawa; three have wastewater treatment plants that produce sludge. The wastewater treatment plants at Camps Schwab, Hansen, and Courtney produce over 1,400 tons of sludge annually. After water is extracted, the sludge is dried. A local contractor loads the dried sludge and transports the dried sludge to a local farmer off base. The farmer stores the sludge until it can be recycled into fertilizer.

The process begins by feeding the hogs at the farm. Waste food is donated by several restaurants and mixed with grains to feed the hogs. The feed is blended to aid in the production of nutrient-rich manure. This manure will be mixed later with the wastewater sludge in the fertilizer production process.

The farm is equipped with a hopper and wood chipper to produce bedding

The wastewater treatment plants at Camps Schwab, Hansen, and Courtney produce over 1,400 tons of sludge annually.

Bobby Thomas (left) and John Kinjo manage the contract to recycle wastewater sludge.
Photo by Chuck Schulz

for the hogs. These wood chips are another component of the fertilizer recipe. Since the chips are part of the bedding in the hogs' living area, the chips naturally mix with hog manure and urine. Encouraging anaerobic growth of some molds and fungal threads on wood chips aids in natural composting. The enriched-chip bedding starts composting nicely on its own. As part of their natural instincts, the hogs kick out the unclean bedding mixture into the aisles. A small dozer cleans the enriched bedding from the aisles and transfers it to a mixing area.

The farmer combines the soiled bedding material with the manure and sludge to achieve the right composition. To aid in the process, floor vents are installed in the containment area that supply heat and moisture to the compost pile. The heat and moisture help the microbes break down and compost the mixture faster. Since the release of heat is directly related to the microbial activity, temperature is a good process indicator. After the compost is cooled to ambient temperature, it is used as enriched fertilizer for land application.

The fertilizer production does not generate a significant odor. The modified fertilizer waste management system succeeds in turning a potentially polluting waste product into a valuable nutrient, while reducing pollution. The typical cost of fertilizer on the local market is high. The Okinawan organic farmer can produce and provide alternative fertilizer to the local farmers using the modified waste management system.

The process to produce fertilizer from wastewater treatment sludge has several advantages:

- Food is recycled from local restaurants to provide feed for the hogs.
- The sludge produced by the treatment plants is diverted from local landfills.
- The odor production from the hog farm is reduced.
- The entire process results in a lower-cost fertilizer for the island's farmers.

By teaming with the local organic farmer, Camp S.D. Butler reduces the cost for wastewater sludge disposal and assists the local farming community with a lower-cost and highly functional fertilizer. ⚓

Bobby Thomas showing how feed mix is produced.
Photo by Chuck Schulz

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